U. S. FOREST SERVICE RESEARCH NOTE PSW- 97

PACIFIC SOUTHWEST FOREST & RANGE EXPERIMENT STATION

Berkeley, California 1966

INTERMOUNTAIN STATION
Central Reference File
No. 0.73 X 3.145

A Petroleum Gel as a Slash Ignition Aid and Fuel Booster

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ABSTRACT: A petroleum gel in blivet and in bulk form was tested as an ignition and fuel boosting agent for burning slash. The gel promoted better ignition and burning of slash than did fusees and diesel oil under the same conditions.

Getting rid of slash by burning can be a problem if the slash is wet. The problem becomes particularly serious if the standard methods of ignition with fusees and drip torches fail. Diesel oil is often used to ignite slash. But its continued use substantially increases the cost of slash burning.

A petroleum gel product[1] has recently been developed as an ignition aid and a fuel booster. In a feasibility study, use of this material in burning slash proved to be practical and efficient.

The Tests

This study was carried out on a ridge top at an elevation of 4,500 feet on the Stanislaus National Forest, in central California. Mixed conifer slash was piled by bulldozers and by hand for the trials. Slash consisted of logging residue and thinnings from a timbered, shaded fuel-break. It ranged in size from twigs, needles, leaves and limbs 6 inches in diameter to small logs 10 inches in diameter. Each pile was built by the same workers. And all piles were comparable in composition and arrangement.

Tests were conducted at three different periods during the winter of 1963-1964. Ten of the 12 hand piles were treated with the petroleum gel and the other two served as the control piles. Of the three bulldozed piles, two were treated and one was the control. All piles were ignited on December 9 after 11 inches of rain had fallen. The same number of piles were burned in March after 17 inches of rain. And an equal number were burned in April after a 22-inch rainfall.

[1] Chevron Fuel Booster, manufactured by the Standard Oil Company of California. Mention of trade names and commercial enterprises or products is solely for necessary information. No endorsement by the U.S. Department of Agriculture is implied.

During the three test periods, 18 hand- and 6 dozer-constructed piles were ignited with diesel oil.

Data collected included the amount of material needed to establish ignition, time required to get ignition, and readings of temperature, relative humidity, and wind speed.

Gel Products Tested

The petroleum gel product used in these tests was available in two forms: (a) the blivet form, or heavy grade, is a thick gel encased in a plastic container 2 inches in diameter and 10 inches long (fig. 1); (b) the free or bulk form, or light grade, is a thinner gel and can be pumped (fig. 2). The bulk form is available in containers of 5 gallons (35 lbs.), 20 gallons (120 lbs.), and 55 gallons (415 lbs.). Blivets come in cartons containing 24 each. A blivet weighs 14 ounces.

The blivet form was easy to place and ignite. It could be ignited manually with a match, fusee, drip torch, or electrically by using squib and ignitor. It can be cut into smaller segments; a portion can be squeeze out when the entire amount is not needed. Blivets can also be precharged with ignitors or grenades and--after ignition--tossed into inaccessible areas.

The bulk gel is designed to be pumped by hand or by a power pump. There must be no restrictions or small passages within the pump system, including the nozzle end. The gel may be pumped directly onto glowing embers or flames without flareback. Pumping is the easiest method of application, but the material can also be hand dipped from the container and placed at the ignition point. Use only the amount necessary to promote ignition or to generate more heat in a weak fire.

The bulk gel often spreads or falls through the pile. This may cause ignition failure when burning wet or green material because the heat is not concentrated enough. Additional amounts of gel are then required. Careful placement of the gel usually eliminates this problem. When burning dry material, spreading the gel will help promote ignition.

The burning characteristics of the petroleum gel are similar to those of diesel oil (table 1). But the gel sticks together and burns for a much longer period because of its chemical composition. In all tests the petroleum gel was lit with a fusee. Six piles were charged with blivets and six piles were charged with three shots of bulk gel from a hand pump. Each hand pump shot delivered 4 ounces of gel.

Results

The December test consisted of one bulldozed and five hand-constructed piles ignited with petroleum gel blivets, and an equal number of piles ignited with bulk gel. The control piles could not be ignited with fusee or drip torch because they were too wet.

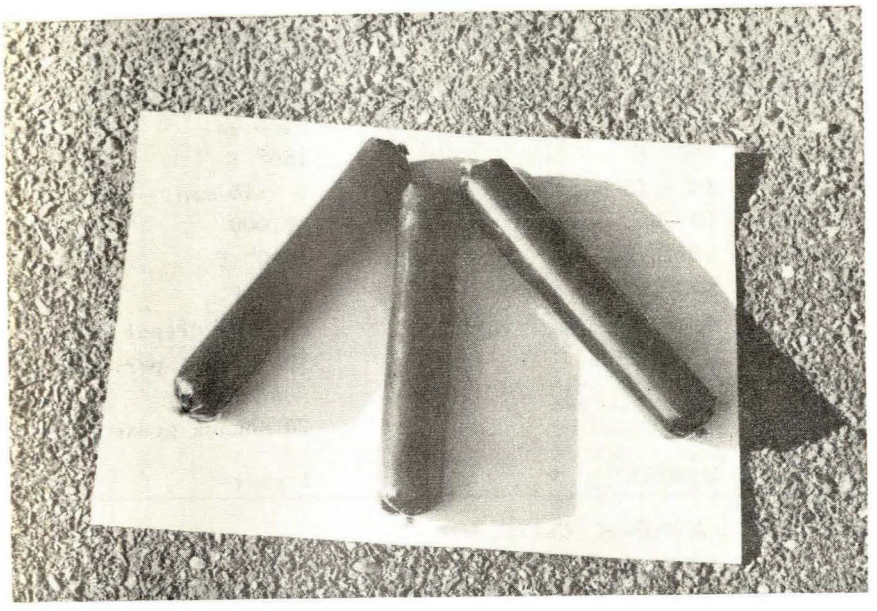

Figure 1.--Blivet form of the gel products tested is a thick gel encased in a 10-inch long plastic container, weighing 14 ounces.

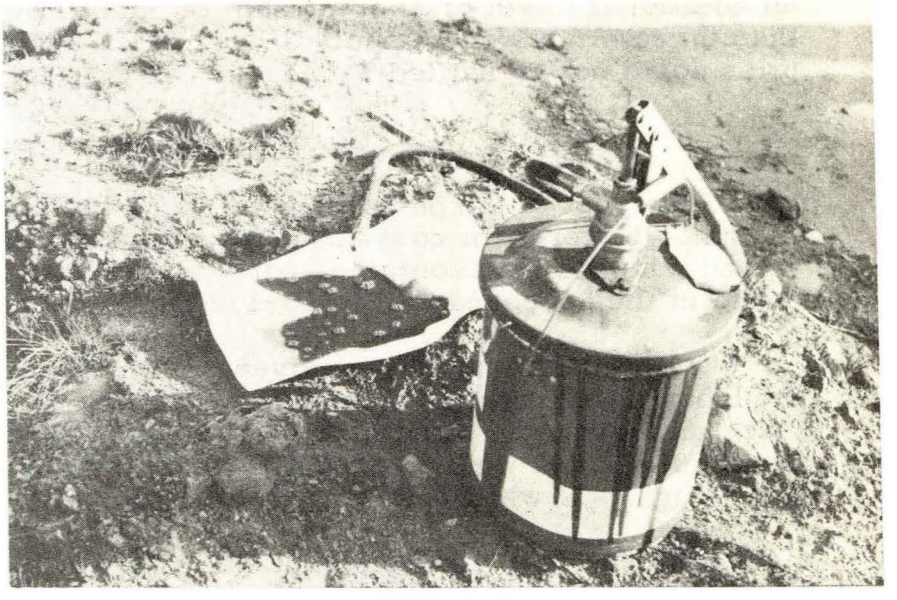

Figure 2.--Bulk form of the petroleum gel is a thinner gel. It is designed to be pumped by hand or by a power pump.

The six piles charged with 14-ounce blivet and the six piles charged with 12 ounces of bulk gel were successfully ignited on the first try.

In February tests, six piles were each charged with one 14-ounce blivet and 12 ounces of bulk gel. The initial charge again successfully ignited all piles.

In the April tests, the six blivet-charged piles and four of the bulk gel-charged piles were ignited on the first attempt. Two of the bulk gel piles had to be recharged with three shots of gel to start ignition.

Table 1.--*Characteristics of petroleum gel*[1]

Characteristics	Heavy form	Light form
Type	Blivet	Free gel
Flash point	160° F.	160° F.
Burning time (about 1 lb.)	10 - 15 min.	5 - 10 min.
B.T.U.	19,000	19,000
Flame temperature	1400° F.	1400° F.
Gel structure breakdown point	500° F.	500° F.
Toxicity	Same as diesel fuel	Same as diesel fuel
Evaporation	Negligible	10 percent per week at 70° F.
Thixotrophic point (shift from gel to liquid	--	20 pounds pressure
Storage time	Indefinite	1 year

[1]Source: California Research Corp., Richmond, Calif.

We also tested these gel products on random piles of slash of various sizes and types. In all cases the piles were ignited, though some required an additional blivet or another shot of bulk gel. In no case did we use more than three blivets or 10 shots of bulk gel. And as in the other tests, the piles could not be ignited with fusee or drip torch.

Costs Compared

The cost of the petroleum gel varied with form and quantity. The 14-ounce blivet form cost about 40 cents per pound. The bulk form price varied with the size container purchased. It ranged from 19 cents per pound in the 35-pound pail to 15-1/2 cents per pound in the 55-gallon drum.

In the cost comparison given below, the computations were based on the labor of one man at an hourly rate of $2.50. It took him 2 minutes to place and ignite the blivets or the bulk gel. In the test using bulk gel, about 10 minutes were needed for him to return to the pile and recharge and re-ignite it when this was necessary.

The cost per pile of establishing fire by each of the three methods tested was as follows:

Cost item:	Ignition using-- 14-oz. blivets	12-oz. bulk gel	Diesel oi
Material	$.35/blivet	$.14-1/2	[1/] $.09
Labor of one man (at $2.50/hr.)	.08	.08	.42
Total	$.43	$.22-1/2	$.51

[1/] Cost of 1/3 to 1/2 gallon of diesel oil, applied at intervals during 10-minute period to promote ignition.

A savings resulted when petroleum gel was used instead of diesel oil for slash ignition or fire boosting. Gel once placed and ignited needed no further attention. On the other hand, diesel oil required continued application until the pile ignites. The added fuel and labor increased the over-all cost.

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